

# The Weekly Rigor

No. 179

“A mathematician is a machine for turning coffee into theorems.”

November 25, 2017

## 101 Problems in Calculating Derivatives Using the Chain Rule with Solutions (Part 15)

### SET 4 PROBLEMS

Find the derivative  $f'(x)$  of each of the following functions.

1.  $f(x) = \sin(e^x)$

2.  $f(x) = e^{e^{2x}}$

3.  $f(x) = \sqrt[3]{(x^2 + x)^2}$

4.  $f(x) = e^{\arccos(2x)}$

5.  $f(x) = \ln(3x^2)$

6.  $f(x) = \sin^2(x)$

7.  $f(x) = (x^3 + x^2 + 4)^{\frac{5}{3}}$

8.  $f(x) = \ln(\arctan(x))$

9.  $f(x) = \sqrt{x^3 + 1}(x^2 + 1)^4$

10.  $f(x) = \arctan(\sin(\ln(e^{\sqrt{x}})))$

11.  $f(x) = \frac{1}{\sqrt[3]{x-1}}$

12.  $f(x) = \frac{e^{2x}}{\sin(3x)}$

13.  $f(x) = \sqrt[5]{1 + x^{\frac{2}{3}}}$

14.  $f(x) = \cos\left(x^{\frac{3}{4}}\right)$

15.  $f(x) = (\ln^2(x^5) - \ln(x))^{-2}$

16.  $f(x) = \arcsin(\arccos(x))$

17.  $f(x) = \left(\frac{x^2-4}{x^3+7}\right)^5$

18.  $f(x) = \sin^3(\cos(2x))$

19.  $f(x) = \ln(x^2)$

20.  $f(x) = \arctan(3x)$

21.  $f(x) = e^{2x} \tan^3(x)$

22.  $f(x) = e^{\frac{2}{5}x}$

23.  $f(x) = \arcsin^3(x^2)$

24.  $f(x) = \ln(3x)$

25.  $f(x) = \sin\left(\sin^2(\sin^3(x^4))\right)$

26.  $f(x) = (e^x + e^{-x})^3$

27.  $f(x) = \tan^4(x)$

28.  $f(x) = \ln(1 + \sqrt{x})$

29.  $f(x) = \ln(e^{x^2})$

30.  $f(x) = \sin(\arctan(x))$

31.  $f(x) = \left(\frac{x^4 - x^5}{x^2 + x^3}\right)^3$

32.  $f(x) = \ln^4(\cos(e^{\sin(x^2)}))$

33.  $f(x) = \left(\frac{x^2 + 3}{x + 1}\right)^3$

34.  $f(x) = \sin(3x)$

35.  $f(x) = \sqrt[4]{\sqrt{x} + x^{\frac{4}{3}}}$

36.  $f(x) = \ln(\sin(x))$

37.  $f(x) = e^{x^3}$

38.  $f(x) = \cos^5(x^2)$

39.  $f(x) = e^{e^x}$

40.  $f(x) = \tan(3x)$

41.  $f(x) = \frac{1}{(\sqrt[3]{x} + x^2)^{-2}}$

42.  $f(x) = \arctan(\sin(x))$

43.  $f(x) = (\sqrt{x^3 + 4})^3$

44.  $f(x) = e^{\cos(4x)}$

45.  $f(x) = (x^2 + x)^2(-x^2 + x^3)^{\frac{3}{2}}$

46.  $f(x) = \frac{1}{\sqrt{(x^3 + x)^5}}$

47.  $f(x) = \left(\frac{x-3}{x+8}\right)^4$

48.  $f(x) = \tan(\sin(x))$

49.  $f(x) = e^{\ln(x^2)}$

50.  $f(x) = \arctan^2(3x)$

51.  $f(x) = (x^2 + 3)^4$

“Only he who never plays, never loses.”